[ ] Install Rubber Feet

Peel off the four rubber feet and apply them to the corners of the enclosure's bottom shell.

[ ] It's "Miller Time"!

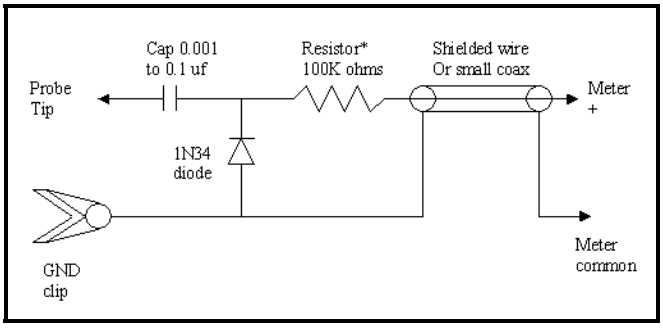
Assembly of the Micro908 is complete.

Section 8: Troubleshooting

In this section we'll help you get your Micro908 instrument working if it doesn't behave as described when power is first applied. You'll need some basic equipment, the schematic from Section B and the pc board layouts from Section C.

Equipment Needed

If you have an oscilloscope that's good to 100 MHz, you'll be all set to probe at all the signals inside the Micro908. But at a minimum, you'll need a volt-ohmmeter (DVM) for DC voltage and resistance measurements. You'll also need an RF probe in order to see the RF voltages that we're dealing with in this instrument. If you don't have an RF probe, like the AccuProbe from the NorTex QRP Club, it's pretty easy to make a simple one. The one shown below can be made up in less than an hour from common junk box parts. If you want to get fancy you could install the components on a narrow piece of perf board and slide it into an old metal cigar tube for shielding. Otherwise just have the probe made from stiff wire affixed to the end of that narrow perf board and an alligator clip for ground. Then with your DVM probe connected to the back end, you can hold the perf board with the "probe tip" at the front end and use it to probe around the circuit.



Simple RF Probe (by Phil DeCaire, WB7AEI, described in QRP Homebrewer #9)

Basic Tests

We'll assume you haven't seen any smoke coming from the circuit board or components. That's always a good starting point for a successful repair of a unit. Otherwise, you'll obviously need to look in the area when the smoke came from, or where the board and components look charred – for that is the place where a component was mis-installed or the place where the problem surfaced from something else (e.g., reversed power supply, etc.)

Power Supply

If you are operating from batteries, be sure the terminal voltage on the battery holder is at least 8.5V. If the level is below that, the RF signal will not be generated properly, or at all, and you will not get expected readings displayed on the LCD.

If operating from an external source, make sure the voltage level does not exceed 16V DC. Beyond this maximum specification, the regulators will be required to dissipate too much power and they'll get too hot for normal operation. Further, the "battery monitor" voltage divider R28 and R41 will present more than 5V to the A/D on the MPU , which would not be too nice.

Make sure you have your battery polarity proper with the wires going to the circuit board, and be sure the connector supplying external power is wired with positive-to-center on the mating plug to J4. If either connection is reversed, your board will not be damaged, but it won't receive the necessary voltage to make it work. In that case … fix it!

With the power switch ON, and the ground probe of your DVM attached to the board ground at the GND test point (located at the bottom-left of the pc board), measure your supply voltage at the +V test point at the +V test point (located at the bottom-center of the pc board). If you don't see the proper voltage, your problem is in the diode arrangement around the battery or power connector and power switch S2.

Measure +5V at the test point located just to the right of regulator U1. If you don't see +5V here, there is likely something pulling down the 5V bus on the board. In this case, U1 is likely getting pretty hot. Power down the unit and find the cause of the problem, which is likely a solder short on any of the closely-spaced terminals of the components or connectors. Also, make sure that the HC908, DDS and DSP daughtercards are oriented properly within their sockets. If they are plugged in backwards (180-degrees out), or shifted up/down one position, chances are this is causing the power supply problems. It's also likely that the daughtercard is damaged (or at least suspect), unfortunately.

Specific Problems

Problem: "The frequency doesn't increment or decrement properly when I turn the Dial"

The fact that the Dial has some effect at all is a good thing and indicates that your board is very likely working. We needed to change the pc board artwork after the HC908 Daughtercards were programmed with "version 2" and you will need to download the latest software (version 3.0) from the project website and load it into your Micro908 using either of the techniques described in Appendix G: "Loading New Software into the Micro908." There will be many occasions of loading new software in the future, so might as well get into it right now! We're sorry that were not able to

Problem: The Serial port isn't sending data to my PC during the 'Debug Monitor' tests.

The RS232 serial port signals of the HC908 Daughtercard were tested at assembly time, so the only possible causes of this condition are the serial cable (needs to be a "straight-thru" cable, not a null modem), or the setup of your terminal program (HyperTerm or whatever). Please check the appropriate section describing these settings to ensure that you have configured the program properly on your PC and that you have the serial port free of any other program trying to control it.

Problem: The LED is not illuminated during a Scan.

You should see a low voltage level at the top of R8 during a Scan and a high one (~5V) when the Scan is complete, corresponding to the LED turning on and off, respectively. If the signal levels are okay, but still no LED illumination, you may have the LED oriented backwards. See the appropriate assembly section to review details for proper orientation.

Problem: No tone is heard when reading SWR with the Tone enabled from the Config menu.

You should see an approximate 3V audio frequency signal on the left side of C40, and be able to trace that through R45, U5, C24 and then on to the the speaker itself. If the signal is there, but still there is no sound, you might have damaged the speaker during installation.

Problem: The readings for SWR, R and X are not changing, or are way off, when I move the Dial or do a Scan.

There may be several causes for this condition.

1) Ensure that you have downloaded the latest version of software (Version 3.0) from the Micro908 web pages and have performed gone through the calibration steps (located under the CONFIG pushbutton).

2) You may not have proper signal levels coming from the DDS Daughtercard. With no load connected to the RF Out jack (J1), dial up a frequency of 1,000.00 and probe the output of the DDS card (J10 pin 6). You should see about 4 Vp-p, or about 1.4 Vrms using an RF Probe. If you do not see these approximate signals, nothing "downstream" will work right and you will need to find the cause of the problem before proceeding.

3) You may have a component problem (wrong part, solder short, etc.) in the reflectometer or buffer amplifiers. Use the following charts to determine if you have the proper levels at the specified points in the circuitry under conditions on J1 of: open circuit, short circuit, and 50-ohm loads. Try to narrow the problem down to a specific channel (Vf, Vr, Vz and Va), and then to a specific point in that signal chain.

Voltage Charts

Typical LCD display of Reflectometer readings in Calibration for the three calibration conditions of **Open** circuit load, **Short** circuit load, and **50-Ohm** circuit:

	Vf	Vr	Vz	Va
Open	FB	FB	FB	01
Short	8C	8F	02	8D
50-ohm	C5	04	67	60

Typical voltages for the four Reflectometer op amp channels in the three calibration conditions of **Open** circuit load, **Short** circuit load, and **50-Ohm** circuit:

	VA	VZ	VR	VF
OPEN CIRCUIT				
Reflectometer output	U3 pin 3 = **0**	U3 pin 10 = **1.9**	U3 pin 12 = **0.8**	U3 pin 5 = **1.8**
First op amp output	U3 pin 1 = **0**	U3 pin 8 = **2.1**	U3 pin 14 = **0.9**	U3 pin 7 = **1.9**
Second op amp output	U4 pin 1 = **0**	U4 pin 8 = **4.8**	U4 pin 14 = **4.8**	U4 pin 7 = **4.8**
SHORT CIRCUIT				
Reflectometer output	U3 pin 3 = **0.7**	U3 pin 10 = **0**	U3 pin 12 = **0.8**	U3 pin 5 = **0.7**
First op amp output	U3 pin 1 = **0.8**	U3 pin 8 = **0**	U3 pin 14 = **0.3**	U3 pin 7 = **0.8**
Second op amp output	U4 pin 1 = **2.7**	U4 pin 8 = **0**	U4 pin 14 = **2.7**	U4 pin 7 = **2.7**
50-OHM CIRCUIT				
Reflectometer output	U3 pin 3 = **0.5**	U3 pin 10 = **0.5**	U3 pin 12 = **0**	U3 pin 5 = **1.0**
First op amp output	U3 pin 1 = **0.6**	U3 pin 8 = **0.6**	U3 pin 14 = **0**	U3 pin 7 = **1.2**
Second op amp output	U4 pin 1 = **1.9**	U4 pin 8 = **1.9**	U4 pin 14 = **0**	U4 pin 7 = **3.8**